

MODULE 4

EXPLAINING NATURAL RESOURCE AND ENVIRONMENTAL DEGRADATION

CONTENTS

4.1 BACKGROUND

4.2 MARKET FAILURE

4.2.1 Introduction

4.2.2 Market Structure, Prices and Resource Degradation

4.2.3 Externalities and Resource Degradation

4.2.4 Property Rights and Market Failure

4.2.5 Property Rights and Market Failure

4.3 POLICY FAILURE

4.3.1 Background

4.3.2 Macro-economic Policies and Natural Resource Degradation

4.3.3 Structural Adjustment Programmes and Resource Degradation

4.4 INSTITUTIONAL AND IMPLEMENTATION FAILURE

4.4.1 Background

4.4.2 Institutional Failure

4.4.3 Implementation Failure

4.5 POPULATION GROWTH, POVERTY, AND THE ENVIRONMENT

4.5.1 Defining Poverty

4.5.2 Measures of Poverty

4.5.3 Population Growth, Economic Development and Environmental Degradation

4.6 SUMMARY

REFERENCES

CASE STUDIES

Case Study 1. Small Scale Alluvial Gold Panning in Zimbabwe

Case Study 2: Degradation of a Fishery, the Example of Lake George

List of Tables

Table 4.1 Comparative development indicators

Table 4.2 Externalities, analysis and policy measures

Table 4.3. Human development indicators for Eastern and Southern African countries

Table 4.4 Population, growth and projections to 2010, Eastern and Southern Africa

Table 4.5 Average annual growth in GDP/capita versus population, Eastern and Southern Africa

List of Figures

Figure 4.1. The price-value continuum

List of Boxes

Box 4.1. The Poverty-Environment Cycle

Box 4.2. Market Failure in Property Rights - The Fishery off Southern Africa's West Coast

Box 4.3. Market Failure in Property Rights - The Lake Victoria Fishery

Box 4.4. Policy Failure - Soil Conservation in Kenya

Box 4.5. Policy Failure - Forest Management in Malawi

Box 4.6. Trade and the Environment – The Case of Danish bottles

Box 4.7. Effects of Structural Adjustments on the Environment

Box 4.8 Implementation Failure in Zimbabwe

4.1 BACKGROUND

Natural resource and environmental degradation, and resulting economic, social impacts are often viewed as a problem unique to developing countries. Deforestation, soil erosion, siltation of rivers and urban pollution are serious impediments to sustainable development in most of the lower income countries in the world. However, degradation of natural resources and the environment is common to some degree throughout the world, spanning different economic and political systems, and touching both rich and poor countries.

Many parts of the mid-western United States and the Canadian prairies experience serious soil erosion because of poor farming and grazing practices. The Grand Banks, one of the world's largest cod fisheries of eastern Canada was closed in 1993 due to over-harvesting. More than 20,000 fishermen and fish plant workers were retrenched in the province of Newfoundland, representing about 20 percent of the employed labour force. Large underground aquifers in parts of the mid-western United States are being drained faster than the natural recharging rate. As the former eastern Bloc countries and the Soviet Union open up, environmental disasters on an unprecedented scale are being disclosed. Some of the world's largest cities such as Beijing, Mexico City and Sao Paulo have air pollution levels that pose a serious human health hazard. Problems of global warming, ozone depletion and acid rain stem from gas emissions largely from more developed and industrialised countries.

Natural resource and environmental degradation is not limited to developing countries. What gives rise to concern however, is the relative severity of resulting impacts in developing countries. Most low-income countries are highly dependent on natural resources and the environment for economic and social development (Table 4.1).

Table 4.1: Comparative development indicators

Indicator	Sub-Saharan Africa	UK	Canada
Total Land Area (1,000 ha)	2,098,331	24,488	997,614
Total Population (million, 1994)	632	58	31
Average Population Growth (% 1960-1994)	2.8	0.3	1.4
Average Population Density (persons/km ²)	30.1	236.9	3.1
Rural Population (% 1994)	65	11	24
Real GDP/capita (PPP\$, 1994)	1,377	18,340	21,459
GNP/capita growth (% 1980-1993)	-1.4	2.3	1.4
Agriculture share of labour (% 1990)	66	2	3
HDI (score out of possible 1.00, data for 1994)	0.38	0.93	0.96

Source: UNDP (1997).

For the economic and social variables in Table 4.1, clear differences exist between the Sub-Saharan African countries and both the UK and Canada. These may help explain natural resource and environmental degradation. The relative differences in GNP per capita illustrate the wide disparity in the general standard of living. The African countries also have a higher proportion of rural population and a higher share of GNP derived from agriculture. Developing countries are struggling with structural adjustment programmes to address crippling foreign debt and balance of payments problems, high inflation and interest rates, and low economic growth. These macro-economic imbalances can discourage foreign direct investment, which is needed to spur economic growth. The Sub-Saharan countries have higher rates of population growth relative to GDP/capita growth. They also lack the required financial resources and technical capacity to generate productive employment. Western countries such as Canada and the UK have greater technical capacity, financial resources and underlying social programmes to address the economic, social and environmental impacts of natural resource and environmental degradation.

The majority of the population in the Sub-Saharan African region survives on subsistence farming or other direct uses of natural resources. The cycle of poverty and resource degradation is difficult to break and illustrates the interdependence of natural resources and the environment in developing countries. A familiar process occurs as population increases and limited land resources are stretched beyond their ecological carrying capacity (Box 4.1):

Box 4.1: The Poverty-Environment Cycle

Tree cover declines, soil fertility and water retention are reduced, soils dry out and are eroded, siltation of rivers decreases storage capacity of dams and further reduces water flow, crop yields decline as soil fertility and moisture retention declines, income and food supplies decrease. Many people might then migrate to cities to eke a living in the informal sector, often living in squalid conditions.

Source: Pearce (1990).

This module considers some of the main causes of this natural resource degradation. They are:

- **Market failure** - where a lack of clear prices or values for natural resources, or poorly functioning markets (including property rights) and distorted relative prices can result in mis-allocation of resources, excess resource exploitation and subsequent degradation by private and public users;
- **Policy failure** - where inappropriate government policies, or an absence of required policy results in market distortions for natural resource use, aggravated market failures, and natural resource degradation by private and public users;
- **Institutional failure** - where a country lacks the necessary government structures, environmental legislation and regulations, or where a decline in traditional land-use management processes occurs, resulting in natural resource degradation;
- **Implementation failure** - where a country lacks the technical capacity and/or financial resources to properly implement and enforce sustainable development policies, programmes and legislation, resulting in natural resource degradation;
- **Population growth** - where a country's population growth results in pressure on the land base in excess of its carrying capacity, resulting in natural resource degradation; and
- **Poverty** - where people struggling to survive tend to follow unsustainable short-term resource utilisation practices in return for short-term consumption gains.

4.2 MARKET FAILURE

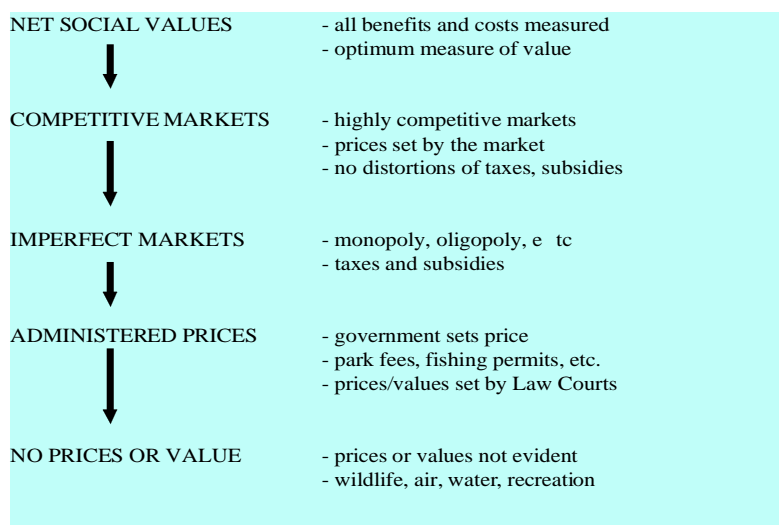
4.2.1 Introduction

A number of conditions can prevent markets from operating efficiently, leading to market failure. Market failure generally occurs in two ways. The first is when the price of a marketed good measures the marginal "private" costs of production, but not the additional social or environmental costs. For a product such as motor vehicles, a competitive market price exists, however this price excludes the cost of air and water pollution during production, congestion costs of an extra car on the road, and the cost of disposal when it is worn out. With alluvial gold panning, the market price for gold excludes the environmental cost of river siltation due to poor panning practices and contamination through the use of mercury to separate gold. For a factory spewing emissions into the environment, the pollution is brought to direct cost to the producer but may bring real health and environmental costs to people in the immediate area. These environmental costs, or "externalities", are a major cause of natural resource and environmental degradation.

Market failure also occurs when there are no prices at all for natural resources or environmental services like air or wetlands. Where land itself has no market price such as in communal areas, overgrazing and poor farming practices can occur. Given the heavy dependence on the rural land base for income generation and subsistence food production in many developing countries, the market structure for land is important in explaining natural resource degradation.

4.2.2 Market Structure, Prices and Resource Degradation

Prices are a very strong incentive (Pearce 1993) to private and public resource users. Where prices are subsidised or do not exist, an incentive is generated to over-exploit natural resources like water, trees, or land. As an example, subsidised agricultural prices can provide an incentive for farmers to apply excess chemical inputs like fertiliser and pesticides in farming, or use more energy and irrigation water than is optimal. Prices are an important measure used to value natural resources and the environment. Prices and hence values, fall along a continuum which partly reflects market structure (Figure 4.1).

Figure 4.1: The price-value continuum

At the top of the continuum, all the costs and benefits of an activity, a product, or service can be quantified. Returning to the example of a car, this measure of value would be the competitive market price (free of taxes and subsidies) adjusted for externalities during production, operation, and disposal. As well, environmental benefits would be added. One term used for this measure is net social value. Net social values are a theoretical point¹. In reality, all costs and benefits can never be measured. Instead, imperfect measures of value are used further down the continuum.

Prices set in perfectly competitive markets are next down the continuum. Cases of prices set under perfect competition are rare. More frequently, market prices are distorted by government taxes and subsidies. Environmental costs are also excluded. A growing divergence between market price and net social value now exists.

Moving further down the continuum, prices might be set under imperfect market conditions. Examples include monopolies or public marketing boards, which can influence price through their market power. Near the bottom of the continuum are administered prices where the government often sets a price for natural resources, usually unrelated to supply and demand. Common examples include the low entrance fees for national parks, fishing permits, timber royalties, and water sold at below marginal cost of supply. At the bottom of the continuum, no markets exist and hence no prices are evident to guide consumption patterns and policy

development. Examples include communal lands, wildlife, public woodlands, water in rivers and lakes, subsistence products of nuts, fruits and game meat.

Most natural resources and environmental services tend to sit near the bottom of the continuum with either administered prices or no prices at all. In these situations, market failure can be a serious problem contributing to resource degradation.

4.2.3 Externalities and Resource Degradation

Externalities are generated when the action of one group in society affects others not directly involved in the activity. For an externality to occur, two conditions must be met. First, the activity of "a" causes a change in welfare of "b" and, second, there is no compensation paid to make up for the change in welfare (Pearce and Turner 1990). Externalities occur in everyday life. Imagine that you and your partner, both non-smokers, are enjoying a quiet dinner in a small restaurant. The people at the next table light up cigars with the smoke blowing your way. You cannot enjoy the evening any longer and go home. A similar example is air or water pollution from a factory, imposing environmental costs upon other groups in society. In both cases, the welfare of one group has been affected and there is no compensation offered. These are clear cases of a negative externality. Externalities are an important factor in explaining natural resource degradation and reflect some of the divergence between net social values and other, less perfect measures on the value continuum. Positive and negative externalities exist in natural resources management and the environment.

Examples of positive externalities include:

- Fishing and tourism benefits after building a dam for irrigation improvement;
- Access to wildlife stocks in a new national park surrounded by villages; and
- Reduced siltation from plantations of trees being established for fuelwood.

Examples of negative externalities include:

¹ Refer to module 9 for a detailed discussion of values as they pertain to environmental goods and services.

- Siltation of river systems and dams downstream from poor agricultural practices;
- River bed damage and siltation from improper commercial forest harvesting practices;
- Pollution of surface and ground water, and growth of water hyacinth from fertiliser run-off in commercial and communal agriculture; and
- Widespread air and water pollution resulting from private factories, lorries, cars and buses in urban environments.

Experience tends to show that negative environmental externalities are more numerous than positive externalities. Negative externalities should be a focal point in natural resource management, environmental protection and development planning. Some examples of externalities, possible valuation approaches and policy considerations are shown in Table 4.2. Valuing the economic costs of negative externalities is difficult but essential to developing effective policy measures².

² Valuation approaches are discussed in module 9.